

SUPPORT FOR THE AMENDMENT

Claims 2-10 are amended. Claims 11-12 are added. Support for the amendment is found in the original claims. No new matter is believed to be introduced by the amendment.

REMARKS

Claims 2-12 are pending. Favorable reconsideration is respectfully requested. At the outset, Applicants thank Examiner Garret for the helpful discussion held on July 18, 2002, and for indicating that compound 17 and Claim 19 are allowable, and for providing helpful suggestions to overcome the rejections in the outstanding Office Action dated March 19, 2002.

The rejection of Claims 1-3 and 10 under 35 U.S.C. § 102(a) over Nakatsuka et al. is believed to be obviated by the above amendment. Further, Claims 2-12 are neither disclosed nor suggested by Nakatsuka et al. (JP 10-340788) in light of the following remarks.

The present invention relates to an electroluminescence device containing a chemical compound of formula [1] to [14] and [16] to [18]. Compounds [1] to [14] contain substituents X^1 to X^{20} which may form a cyclic structure. When these substituents are arranged so that a pair of adjacent substituents are aryl groups, at least one of the substituents contains an amine group or an alkenyl group. Accordingly, some of the claimed compounds may contain a fluoranthene skeleton structure containing at least one amine group or alkenyl group. The claimed chemical compound is particularly suited for a hole transporting layer or light emitting layer of an organic EL device.

As discussed with the Examiner during the above-mentioned Interview, Nakatsuka et al. discloses an electroluminescence element containing an compound having only a

fluoranthene skeleton structure. However, Nakatsuka et al. fails to disclose a fluoranthene skeleton structure comprising any substituted amine group or any substituted alkenyl group. Further, Nakatsuka et al. fails to suggest substituting the fluoranthene structure with an amine group or an alkenyl group. Accordingly, Nakatsuka et al. fail to disclose or suggest the claimed electroluminescence device, and withdrawal of this ground of rejection is respectfully requested.

The rejection of Claims 4, 7, and 8 under 35 U.S.C. § 103(a) over Nakatsuka et al. is believed to be obviated by the above amendment. Further Nakatsuka et al. fail to disclose or suggest the claimed invention in light of the following remarks.

As stated above, the present invention relates to an electroluminescence device containing a chemical compound that may have a fluoranthene skeleton structure which is substituted with at least one amine group and/or alkenyl group, while Nakatsuka et al. discloses only an electroluminescence device containing chemical compound having a fluoranthene skeleton group without any substituted amine group and/or any substituted alkenyl group. Further, Nakatsuka et al. fails to suggest substituting the disclosed fluoranthene skeleton structure with an amine group or an alkenyl group.

The Examiner's attention is directed to inventive example 1 and comparative examples 1-3 at pages 63, line 1, to page 66, line 12, of the specification. The inventive example 1 relates to a chemical compound having a fluoranthene skeleton structure substituted with at least one amine group or alkenyl group, while comparative examples 1-3 provide chemical compounds having a fluoranthene skeleton structure lacking an amine or alkenyl group substitution. Applicants further disclose that organic EL devices were constructed containing the above-mentioned inventive example 1 compound and

comparative examples 1-3 compounds. The following characteristics of the inventive and comparative organic EL devices were measured: 1) the luminance under application of a direct current of 5.5 volt, 2) the efficiency of light emission, 3) the emitted light color, 4) the half life when the device was driven under a constant current at an initial luminance of 500cd/m². The following table summarizes the results disclosed on the above-mentioned pages for the Examiner's convenience.

TABLE 1: Summarizing the Comparative data between the Inventive Example and the Comparative Examples corresponding to that disclosed in Nakatsuka et al.

Example	Luminance	Efficiency	Color	half-life
Inventive 1	103 cd/m ²	6.2 cd/A	orange	2600 hrs
Comparative 1	105 cd/m ²	7.6 cd/A	yellow	1000 hrs
Comparative 2	35 cd/m ²	3.0 cd/A	yellow-green	300 hrs
Comparative 3	69 cd/m ²	1.3 cd/A	yellow-green	400 hrs

The Examiner is directed to page 2, line 20-24, where one object of the present invention is to provide an compound that may be incorporated into an organic EL device so that the organic EL device exhibits an excellent purity of color, a high efficiency of light emission, a long life, and emits a reddish light. The above table demonstrates that Applicants have discovered such an organic EL device, and that such properties are achieved due to the presence of the novel claimed compounds in the device.

The claimed EL device that may contain compounds having a fluoranthene skeleton structure substituted with at least one amine group or alkenyl group is patentably distinct

from the applied art. Further, such compounds are able to provide organic EL devices with superior qualities when compared to those of the comparative organic EL devices which contain compounds having fluoranthene skeleton structure without an amine group or alkenyl group. Since the comparative compounds containing the fluoranthene skeleton structure without any substituted amine group or substituted alkenyl group are disclosed by Nakatsuka et al. and Applicants have demonstrated the superior quality of the claimed compounds containing a fluoranthene skeleton structure substituted with an amine group or substituted with an alkenyl group, Applicants respectfully submit that Nakatsuka et al. fails to describe or suggest any claimed compound. Accordingly, withdrawal of this ground of rejection is respectfully requested.

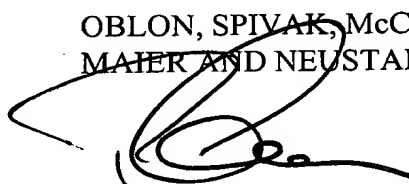
The objection to the drawings is believed to be obviated by the submission of corrected drawings attached hereto. Accordingly, the withdrawal of this ground of rejection is respectfully requested.

The objection of Claims 5 and 6 under 37 C.F.R. § 1.75(c) is believed to be obviated by the above amendment. Amended Claims 5 and 6 no longer are multiple dependent claims. Accordingly, withdrawal of this ground of rejection is respectfully requested.

Applicants respectfully submit that the present application is now in condition for allowance. Early notice to this effect is respectfully requested. Should anything further be required to place this application in condition for allowance, the Examiner is requested to contact the undersigned by telephone.

Respectfully submitted,

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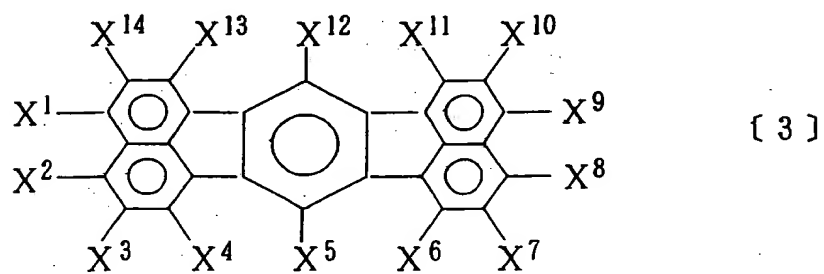
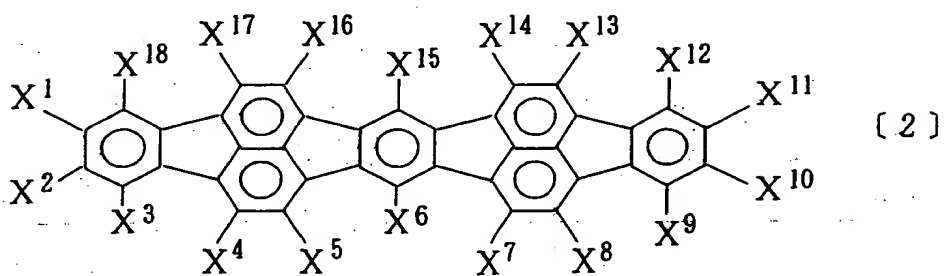
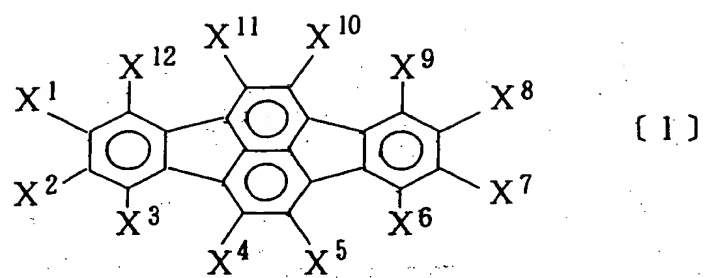
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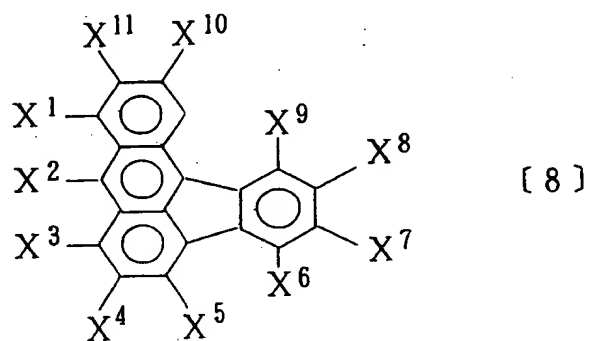
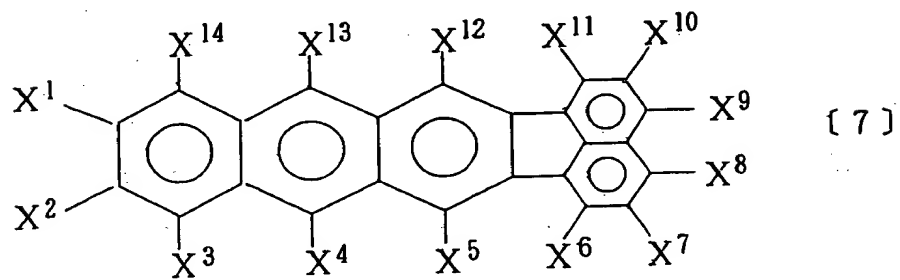
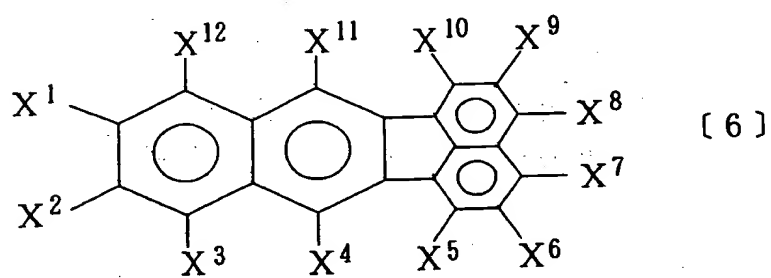
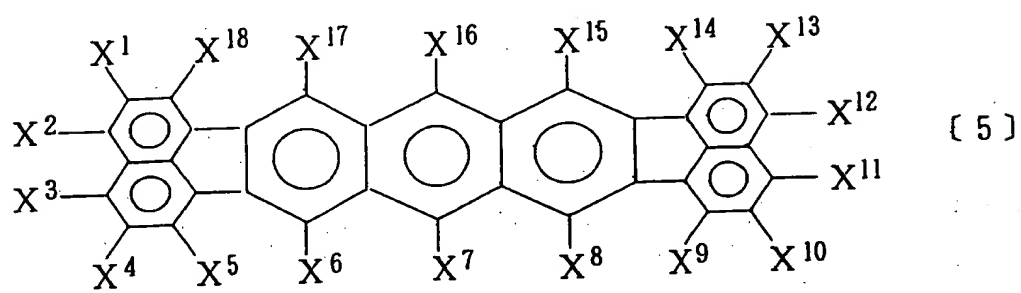
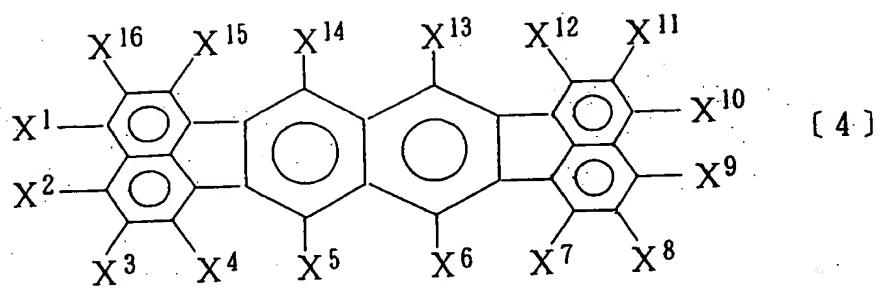
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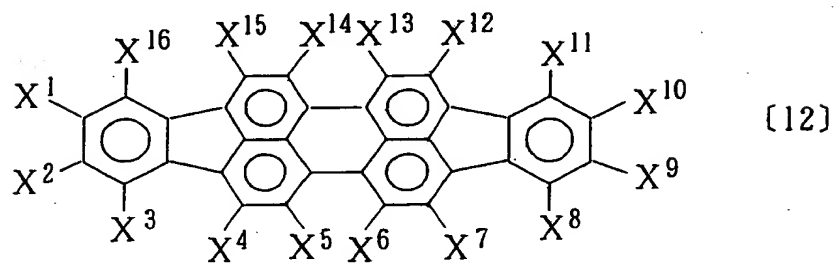
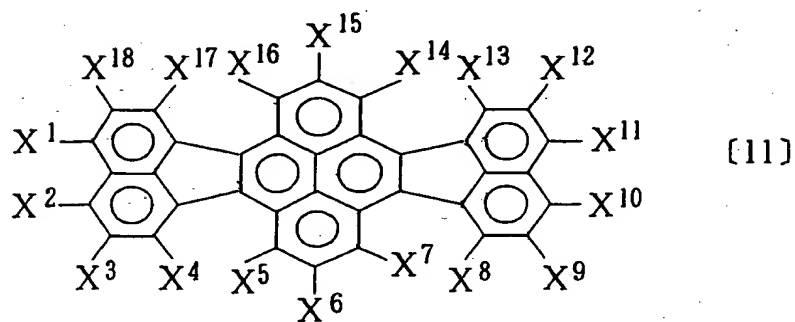
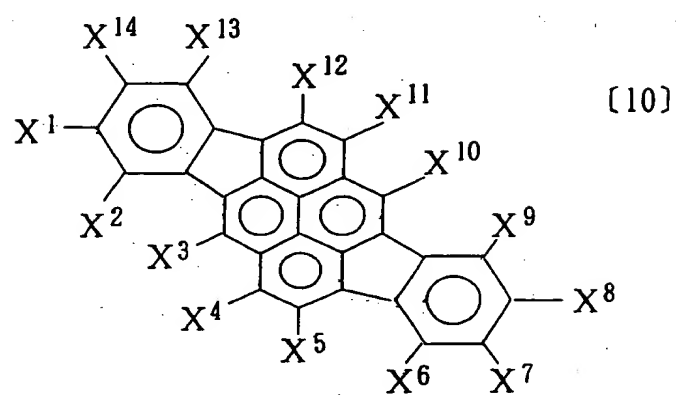
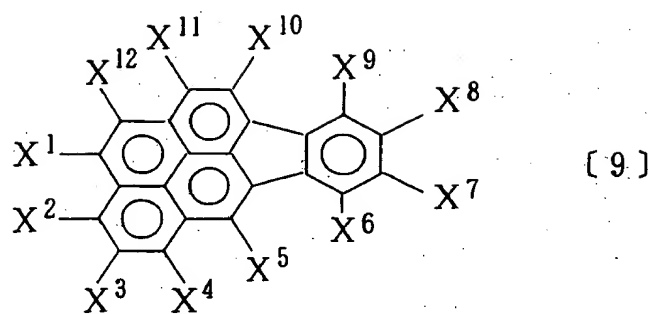
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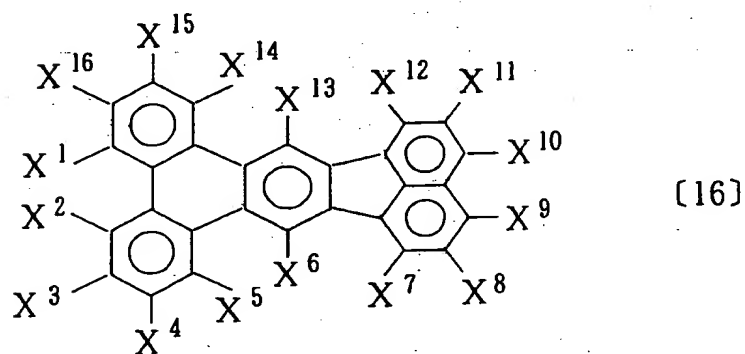
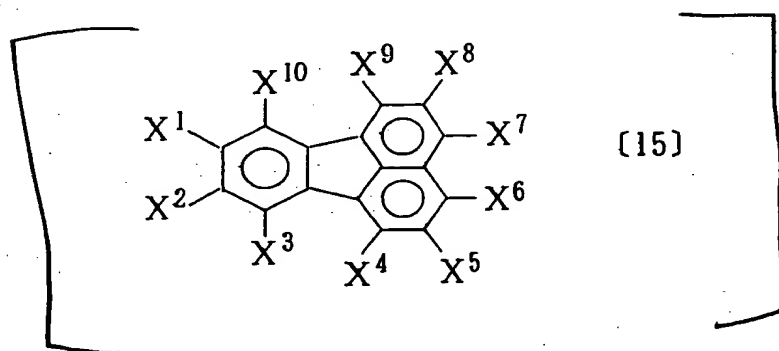
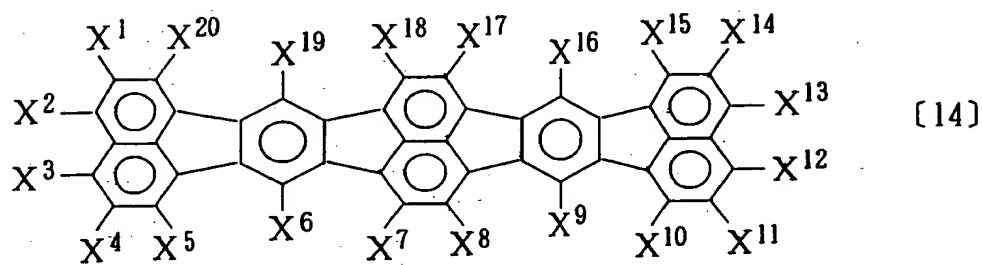
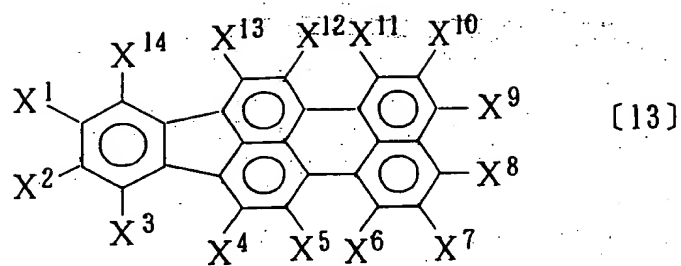
IN THE CLAIMS

--2. (Amended) An organic electroluminescence device [according to Claim 1 wherein said compound is a compound], comprising an organic layer disposed between at least one pair of electrodes, wherein the organic layer comprises at least one compound selected from compounds represented by the following general formulae [1] to [[18]] ~~[14]~~ and [16] to [18]:

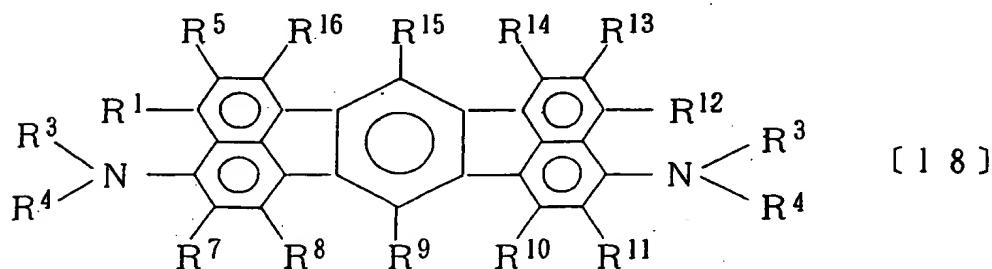
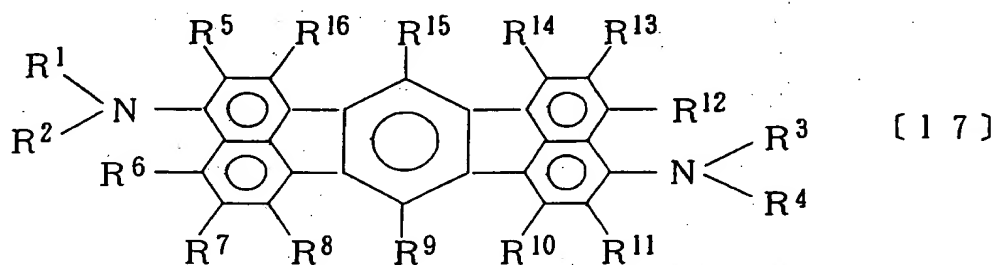








wherein X^1 to X^{20} each independently represents hydrogen atom, a linear, branched or cyclic alkyl group having 1 to 20 carbon atoms, a linear, branched or cyclic alkoxy group having 1 to 20 carbon atoms, a substituted or unsubstituted aryl group having 6 to 30 carbon atoms, a substituted or unsubstituted aryloxy group having 6 to 30 carbon groups, a substituted or unsubstituted arylamino group having 6 to 30 carbon atoms, a substituted or unsubstituted alkylamino group having 1 to 30 carbon atoms, a substituted or unsubstituted arylalkylamino group having 7 to 30 carbon atoms or a substituted or unsubstituted alkenyl groups having 8 to 30 carbon atoms; a pair of adjacent groups represented by X^1 to X^{20} and a pair of adjacent substituents to groups represented by X^1 to X^{20} may form a cyclic structure in combination; when a pair of adjacent substituents are aryl groups, the pair of substituents may be a single group; and at least one of substituents represented by X^1 to X^i , i representing a number of 12 to 20, comprises an amine group or an alkenyl group; with the exception that the combination of substituted group X^{13} and X^{14} , X^3 and X^4 , X^{10} and X^{11} , and X^6 and X^7 with any ring structure in the general formula (3) is omitted;



wherein R¹ to R⁴ each independently represent an alkyl group having 1 to 20 carbon atoms or a substituted or unsubstituted aryl group having 6 to 30 carbon atoms; in one or both of a pair of groups represented by R¹ and R² and a pair of groups represented by R³ and R⁴, the groups forming the pair may be bonded through -O- or -S-; R⁵ to R¹⁶ represents hydrogen atom, a linear, branched or cyclic alkyl group having 1 to 20 carbon atoms, a linear, branched or cyclic alkoxy group having 1 to 20 carbon atoms, a substituted or unsubstituted aryl group having 6 to 30 carbon atoms, a substituted or unsubstituted aryloxy group having 6 to 30 carbon groups, a substituted or unsubstituted arylamino group having 6 to 30 carbon atoms, a substituted or unsubstituted alkylamino group having 1 to 30 carbon atoms, a substituted or unsubstituted arylalkylamino group having 7 to 30 carbon atoms or a substituted or unsubstituted alkenyl groups having 8 to 30 carbon atoms; a pair of adjacent groups represented by R⁵ to R¹⁶ and a pair of adjacent substituents to groups represented by R⁵ to R¹⁶ may form a cyclic structure in combination; and at least one of substituents represented by R⁵ to R¹⁶ comprises an amine group or an alkenyl group.

3. [An] The organic electroluminescence device according to [any of Claims] Claim [1 and] 2, wherein the organic layer is at least one of a hole transporting layer and a light emitting layer.

4. [An] The organic electroluminescence device according to Claim [1] 2, wherein the organic layer comprises 1 to 70% by weight of said compound which is selected from compounds represented by general formulae [1] to [[18]] [14] and [16] to [18].

5. [An] The organic electroluminescence device according to [any of Claims] Claim [1 to 4] 2, wherein a layer of an inorganic compound is disposed between the organic layer and the electrode.

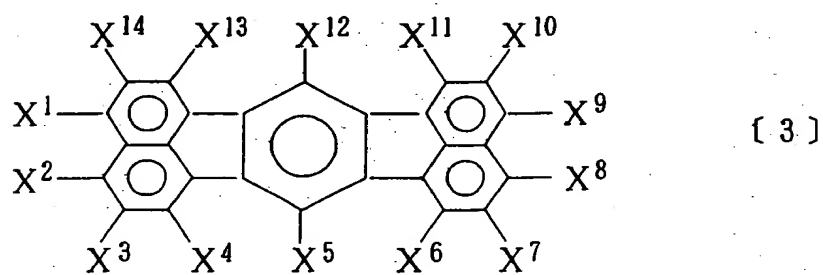
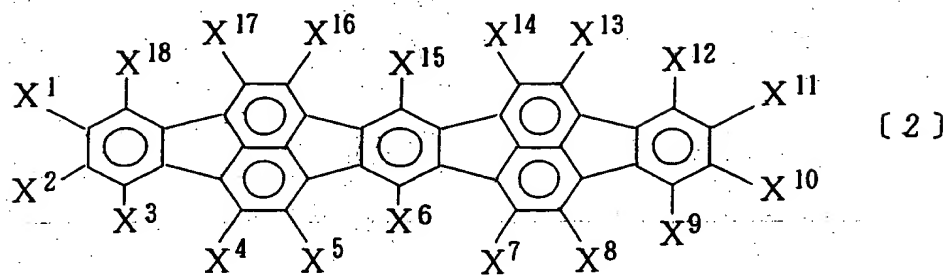
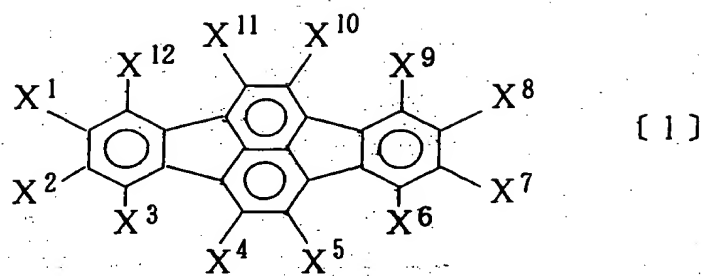
6. [An] The organic electroluminescence device according to [any of Claims] Claim [1 to 5] 2, which emits reddish light.

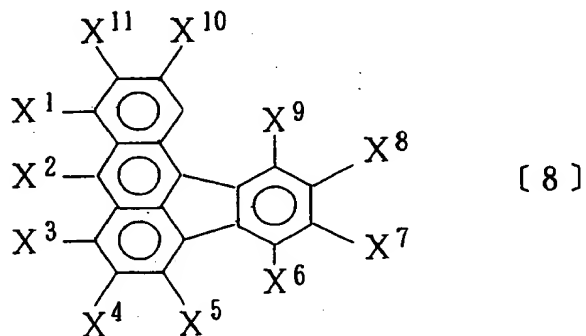
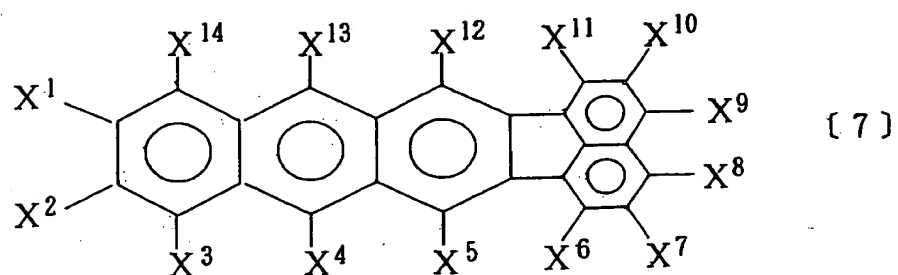
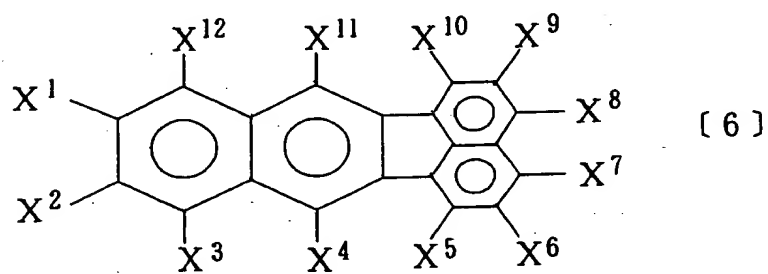
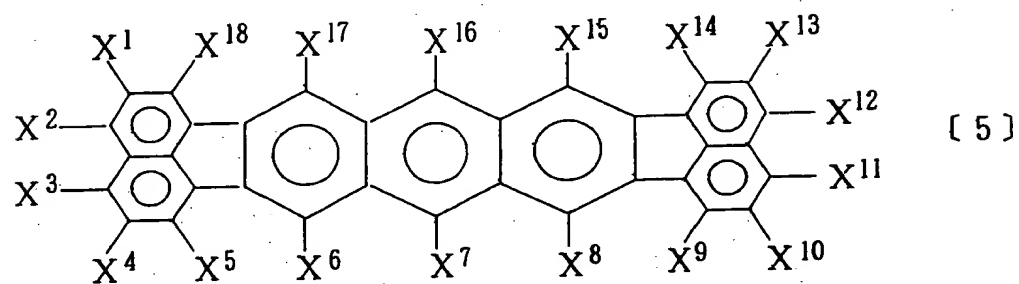
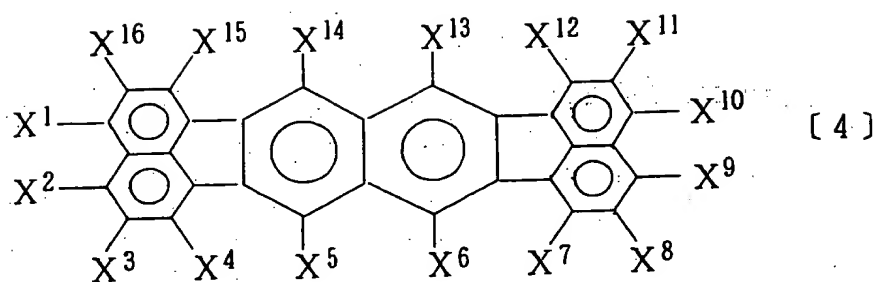
7. [An] The organic electroluminescence device according to Claim [1] 2, wherein the organic layer comprises said compound and isomers thereof.

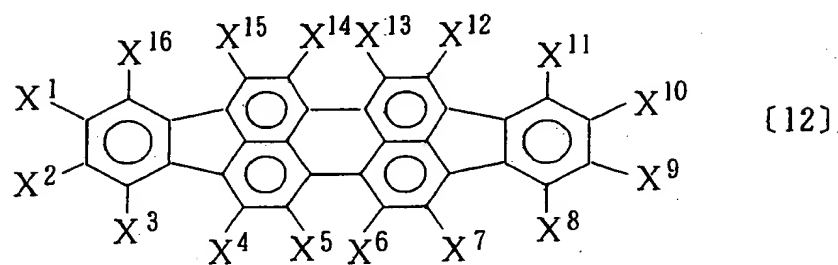
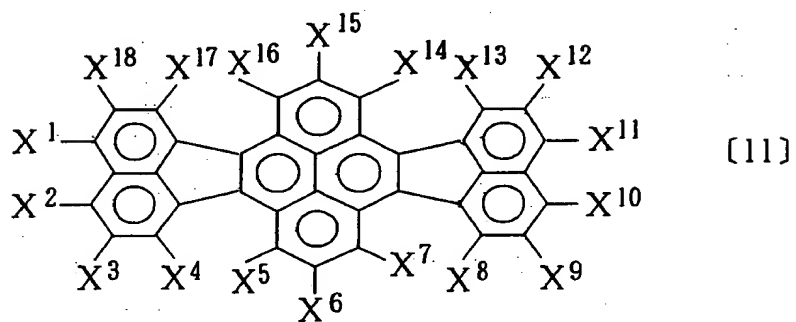
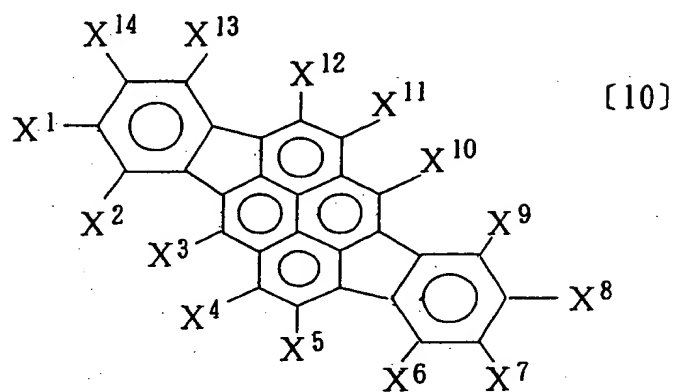
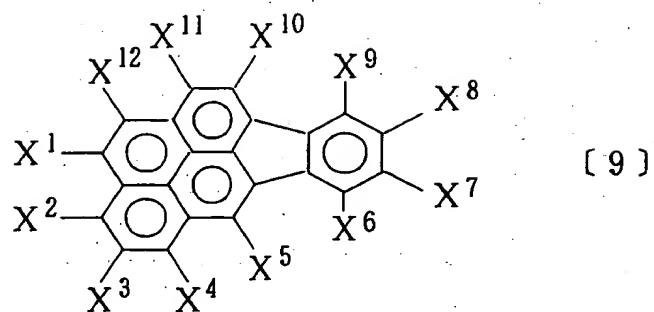
8. [An] The organic electroluminescence device according to Claim 7, wherein, among said compound and the isomers thereof, a ratio of an amount by mole of an isomer which can emit light having a longer wavelength to an amount by mole of an isomer which can emit light having a shorter wave is in a range of 90:10 to 60:40.

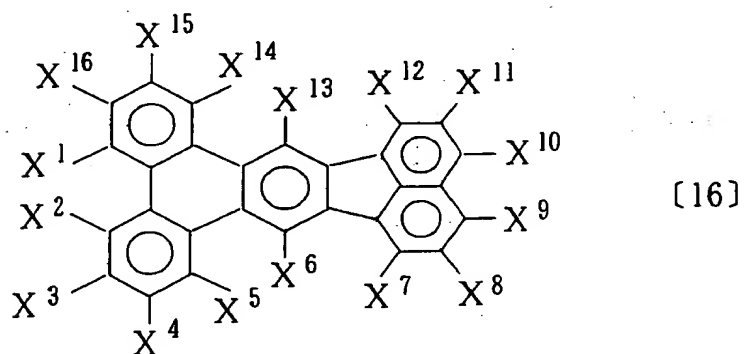
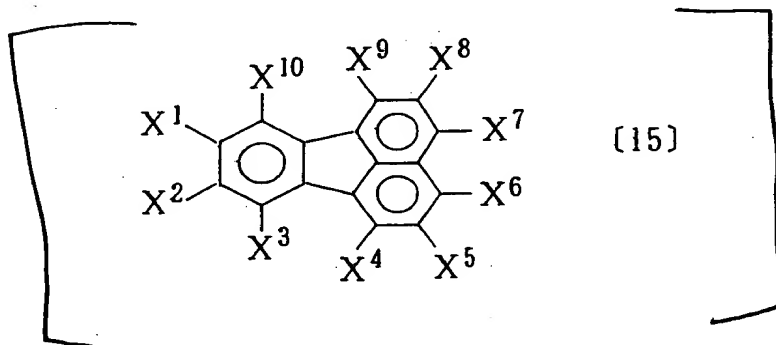
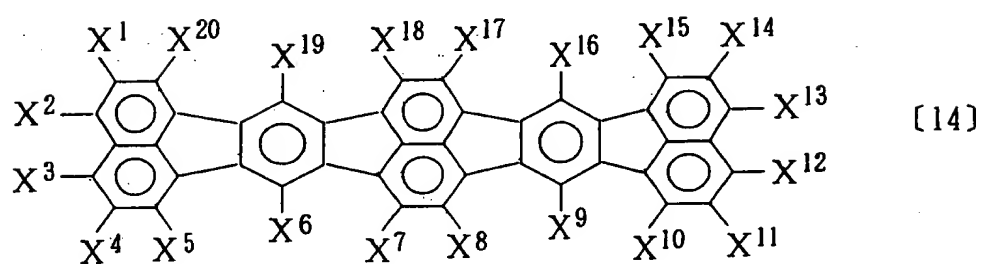
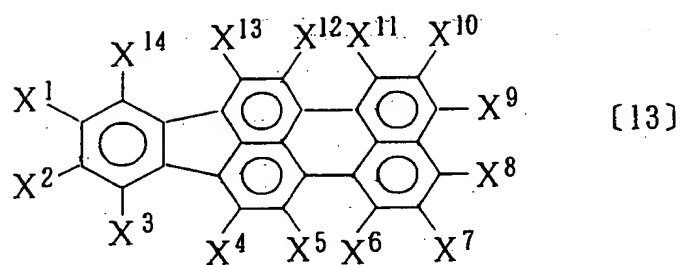
9. [An] The organic electroluminescence device according to Claim 7, wherein, among said compound and the isomers thereof, a ratio of an amount by mole of an isomer represented by general formula [17] to an amount by mole of an isomer represented by general formula [18] is in a range of 90:10 to 60:40.

10. A [novel] compound represented by any of the following general formulae [1] to [[18]] [14] and [16] to [18]:

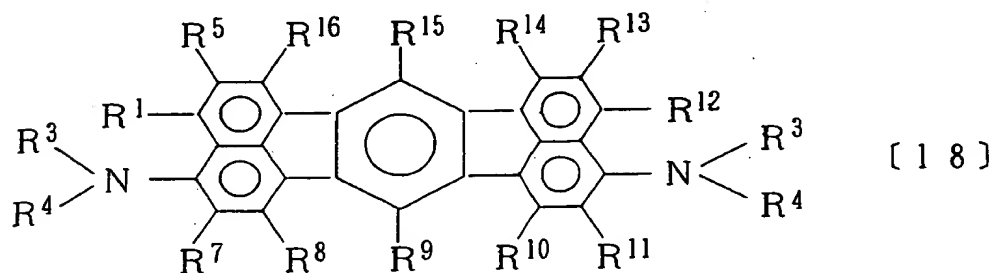
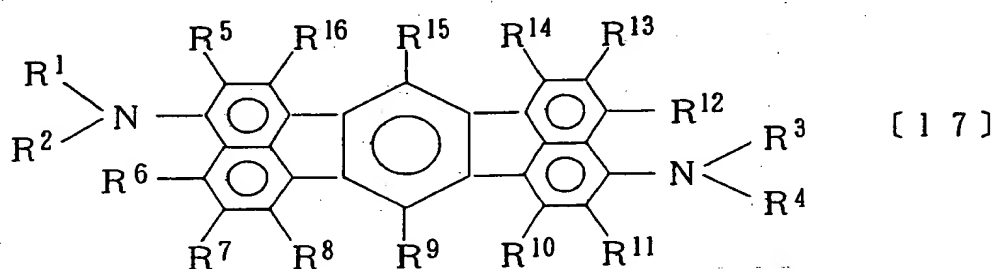








wherein X^1 to X^{20} each independently represents hydrogen atom, a linear, branched or cyclic alkyl group having 1 to 20 carbon atoms, a linear, branched or cyclic alkoxy group having 1 to 20 carbon atoms, a substituted or unsubstituted aryl group having 6 to 30 carbon atoms, a substituted or unsubstituted aryloxy group having 6 to 30 carbon groups, a substituted or unsubstituted arylamino group having 6 to 30 carbon atoms, a substituted or unsubstituted alkylamino group having 1 to 30 carbon atoms, a substituted or unsubstituted arylalkylamino group having 7 to 30 carbon atoms or a substituted or unsubstituted alkenyl groups having 8 to 30 carbon atoms; a pair of adjacent groups represented by X^1 to X^{20} and a pair of adjacent substituents to groups represented by X^1 to X^{20} may form a cyclic structure in combination; when a pair of adjacent substituents are aryl groups, the pair of substituents may be a single group; and at least one of substituents represented by X^1 to X^i , i representing a number of 12 to 20, comprises an amine group or an alkenyl group; with the exception that the combination of substituted group X^{13} and X^{14} , X^3 and X^4 , X^{10} and X^{11} , and X^6 and X^7 with any ring structure in the general formula (3) is omitted:



wherein R¹ to R⁴ each independently represent an alkyl group having 1 to 20 carbon atoms or a substituted or unsubstituted aryl group having 6 to 30 carbon atoms; in one or both of a pair of groups represented by R¹ and R² and a pair of groups represented by R³ and R⁴, the groups forming the pair may be bonded through -O- or -S-; R⁵ to R¹⁶ represents hydrogen atom, a linear, branched or cyclic alkyl group having 1 to 20 carbon atoms, a linear, branched or cyclic alkoxy group having 1 to 20 carbon atoms, a substituted or unsubstituted aryl group having 6 to 30 carbon atoms, a substituted or unsubstituted aryloxy group having 6 to 30 carbon groups, a substituted or unsubstituted arylamino group having 6 to 30 carbon atoms, a substituted or unsubstituted alkylamino group having 1 to 30 carbon atoms, a substituted or unsubstituted arylalkylamino group having 7 to 30 carbon atoms or a substituted or unsubstituted alkenyl groups having 8 to 30 carbon atoms; a pair of adjacent groups represented by R⁵ to R¹⁶ and a pair of adjacent substituents to groups represented by R⁵ to R¹⁶ may form a cyclic structure in combination; and at least one of substituents represented by R⁵ to R¹⁶ comprises an amine group or an alkenyl group.--

--Claim 1 is cancelled.--

--Claims 11-12 are added.--